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58

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/871,778	06/01/2001	Christopher J. Dollin	10011618-1	3004

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HEWLETT-PACKARD COMPANY  
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EXAMINER

RAMPURIA, SATISH

ART UNIT PAPER NUMBER

2191

DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/871,778	Applicant(s) DOLLIN ET AL.	
	Examiner Satish S. Rampuria	Art Unit 2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

*A*

*Response to Amendment*

1. This action is in response to the amendment received on 09/22/2004.
2. The finality of the office action mailed on 12/22/2004 is withdrawn as described in interview summary dated April 20, 2005.
3. Claims 1-16 are pending.

*Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claim 1, 2, 5, 8, 9, 14, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,601,114 to Bracha et al., hereinafter called Bracha.

**Per claims 1 and 2:**

Bracha disclose:

- A code verification system (col. 7, lines 55-56 “instructions verification within the verify instructions step”)
- memory for storing (col. 10, line 53 “storage device into memory”); a compiled program (col. 10, lines 46-47 “instructions typically generated by a compiler”) and
- a code verifier configured to analyze instructions of said program (col. 10, line 62 “verification is performed by the JVM” and col. 10, lines 65-66 “verification includes identifying... instruction sequence”) and to generate a plurality of type signatures based on said instructions (col. 17, lines 30-32 “pre-verification constraints... stored... or the module itself, or both... have attached a signal, such as a digital signature”), each of said type signatures indicating each input type constraint and each output type description for a respective one of said instructions (col. 17, lines 33-35 “can be used to reliably identify the source of the module or constraints and indicate whether they may have been tampered with since being signed”), wherein said code verifier is configured to detect a type error by analyzing said type signatures (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”).

**Per claim 5:**

Bracha disclose:

- memory for storing a compiled program (col. 10, line 53 “storage device into memory” and col. 10, lines 46-47 “instructions typically generated by a compiler”); and

- a code verifier configured to analyze a code block of said program (col. 10, line 62 “verification is performed by the JVM” and col. 10, lines 65-66 “verification includes identifying... instruction sequence”) and to translate instructions within said code block into a plurality of type signatures (col. 17, lines 30-32 “pre-verification constraints... stored... or the module itself, or both... have attached a signal, such as a digital signature”), said code verifier further configured to compose said type signatures into a single composed type signature and to detect a type error by analyzing said type signatures (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”)

**Per claims 8, 9, 14, and 15:**

Bracha disclose:

- storing a compiled program (col. 10, line 53 “storage device into memory” and (col. 10, lines 46-47 “instructions typically generated by a compiler”);
- generating a plurality of type signatures based on instructions within said program (col. 17, lines 30-32 “pre-verification constraints... stored... or the module itself, or both... have attached a signal, such as a digital signature”), each of said type signatures indicating each input type constraint and each output type description for a respective one of said instructions (col. 17, lines 33-35 “can be used to reliably identify the source of the module or constraints and indicate whether they may have been tampered with since being signed”);

- analyzing said type signatures; and detecting a type error based on said analyzing step (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”)

Substantially as claimed.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 3, 4, 6, 7, 10-13, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bracha in view of US Patent No. 6,092,147 to Levy et al., hereinafter called Levy.

**Per claim 11:**

Bracha disclose:

- storing a compiled program (col. 10, line 53 “storage device into memory” and (col. 10, lines 46-47 “instructions typically generated by a compiler”);, said compiled program having at least one code block that includes a plurality of instructions (col. 9, lines 50-55 “a compiler 164 which compiles the source code 162 to produce one or more modules 165, 166 containing instructions such as VM instructions, and a processor such as a virtual machine (VM) 167 which takes one or more modules 165, 166 as input and executes the program they generate”);

- translating said instructions into a plurality of type signatures (col. 17, lines 30-32 “pre-verification constraints... stored... or the module itself, or both... have attached a signal, such as a digital signature”);
- analyzing said type signatures (col. 10, line 62 “verification is performed by the JVM” and col. 10, lines 65-66 “verification includes identifying... instruction sequence”); and detecting a type error based on said analyzing step (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”)

Bracha does not explicitly disclose composing said type signatures into a single composed type signature.

However, Levy discloses in an analogous computer system composing said type signatures into a single composed type signature (col. 7, lines 25-26 “authenticity verifier 82... compute a proof of authenticity on the bytecode(s) received from the outside world” and col. 7, lines 32-34 “a message authentication code of a pre-defined form computed with a block-cipher algorithm, or a digital signature of a pre-defined form computed with an asymmetric algorithm”).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of code verifier composing the signature and determine the input constraint to an output constraint as taught by Levy into the method of verification code as taught by Bracha. The modification would be obvious because of one of ordinary skill in the art would be motivated to compose the verification signature and determine input/output constraints to securely distribute code as suggested by Levy (col. 2, lines 17-30).

**Per claims 3, 7, 10, 13, and 16:**

The rejection of claim 1, 5, 10, and 11 is incorporated, respectively, and further, Bracha disclose:

- wherein said code verifier is further configured to analyze said program and to group instructions of said program into a plurality of code blocks (col. 18, lines 62-65 “FIG. 8 shows how a module, which has been verified one-module-at-a-time before run time”)
- wherein said code verifier is configured to translate said code blocks into type signature blocks (col. 17, lines 40-42 “substantially complete module-by-module pre-verification can be performed for the intra-module checks” and col. 17, lines 30-32 “pre-verification constraints... stored... or the module itself, or both... have attached a signal, such as a digital signature”)
- each of said type signature blocks having one or more type signatures (col. 17, lines 31-32 “module itself, or both... have attached a signal, such as a digital signature”),

Bracha does not explicitly disclose said code verifier further configured to compose the type signatures of each of said type signature blocks into a single respective composed type signature.

However, Levy discloses in an analogous computer system said code verifier further configured to compose the type signatures of each of said type signature blocks into a single respective composed type signature (col. 7, lines 25-26 “authenticity verifier 82... compute a proof of authenticity on the bytecode(s) received from the outside world” and col. 7, lines 32-34 “a message authentication code of a pre-defined form computed with a block-cipher algorithm, or a digital signature of a pre-defined form computed with an asymmetric algorithm”).



Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of code verifier composing the signature and determine the input constraint to an output constraint as taught by Levy into the method of verification code as taught by Bracha. The modification would be obvious because of one of ordinary skill in the art would be motivated to compose the verification signature and determine input/output constraints to securely distribute code as suggested by Levy (col. 2, lines 17-30).

**Per claim 4:**

The rejection of claim 3 is incorporated, and further, Bracha disclose:

- said code verifier further configured to make a determination as to whether an input type constraint of said first type signature is acceptable to an output type description of said second type signature (col. 17, lines 33-35 “can be used to reliably identify the source of the module or constraints and indicate whether they may have been tampered with since being signed”)
- said code verifier further configured to detect said type error based on said determination (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”)

Bracha does not explicitly disclose wherein said code verifier, in composing one of said type signature blocks, is configured to compose a first type signature with a second type signature to form a single composed signature, said first and second type signatures included within said one type signature block.

However, Levy discloses in an analogous computer system wherein said code verifier, in composing one of said type signature blocks, is configured to compose a first type signature with a second type signature to form a single composed signature, said first and second type signatures included within said one type signature block (col. 7, lines 25-26 “authenticity verifier 82... compute a proof of authenticity on the bytecode(s) received from the outside world” and col. 7, lines 32-34 “a message authentication code of a pre-defined form computed with a block-cipher algorithm, or a digital signature of a pre-defined form computed with an asymmetric algorithm”).

The feature of composing signature blocks would be obvious for the reasons set forth in the rejection of claim 3.

**Per claims 6 and 12:**

The rejection of claim 5 and 11 is incorporated, respectively, and further, Bracha disclose:

- wherein said code verifier is further configured to detect said type error by comparing said type descriptions (col. 17, lines 36-37 “intra-module verification checks of validity...during conventional verification”)

Bracha does not explicitly disclose wherein one of said type signatures includes a type description indicative of a type of an input consumed by one of said instructions when said one instruction is executed, wherein another of said type signatures includes a type description indicative of a type of an output produced by another of said instruction when said other instruction is executed.

However, Levy discloses in an analogous computer system wherein one of said type signatures includes a type description indicative of a type of an input consumed by one of said instructions when said one instruction is executed (col. 7, lines 35-38 “The authenticity verifier 82 ensures that no bytecode(s) may reach the VM 78 or be executed by the VM unless the authenticity verifier has first successfully verified the authenticity of such bytecode(s)”), wherein another of said type signatures includes a type description indicative of a type of an output produced by another of said instruction when said other instruction is executed (col. 8, line 65 to col. 9 line 1 “a proof of authenticity may be generated, as described above, and the proof of authenticity may be appended to the verified bytecode(s) to produce an authenticated bytecode file”).

The feature of signatures including type description of input/output would be obvious for the reasons set forth in the rejection of claim 3.

### ***Response to Arguments***

8. Applicant’s arguments with respect to claims 1, 5, 8, and 11 have been considered but they are not persuasive.

#### ***In the remarks, the applicant has argued that:***

- (i) For claims 1, 5, and 8 cited reference does not suggest the limitations (1) generating a plurality of signatures based on said instructions, (2) each type signature indicating each input type constraint, and (3) each type signature indicating each output type description for a respective one of said instructions.

#### ***Examiner’s response:***

(i) Regarding the limitations as cited in claims 1, 5, and 8 applicant agrees that Bracha does disclose the verification process of module/class using the digital signature (applicant's amendment, page 10). Bracha verifies module-by-module using digital signature at pre-runtime in which it would be obvious to verify the instructions within the module/class. Thus, Bracha does disclose the limitations cited in the claims. Applicant only makes general allegations do not point out any errors in the rejection. Therefore, the rejection is proper and maintained herein.

***In the remarks, the applicant has argued that:***

(ii) For claim 11 combination of Bracha and Levy does not teach or suggest the limitation translating said instructions into a plurality of type signature and composing said type signatures into a single composed type signature as claimed.

***Examiner's response:***

(ii) Regarding the limitations as cited in claim 11. It is noted that the rejection clearly points out where the combination of Bracha and Levy teach the claimed features and why it would have been obvious to combine their teachings (see previous office action). Applicant only makes general allegations do not point out any errors in the rejection. Therefore, the rejection is proper and maintained herein.

***Conclusion***

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Satish S. Rampuria** whose telephone number is (571) 272-3732. The examiner can normally be reached on 8:30 am to 5:00 pm Monday to Friday except every other Friday and federal holidays. Any inquiry of a general nature or relating to the status of this application should be directed to the **TC 2100 Group receptionist: 571-272-2100**

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Tuan Q. Dam** can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Satish S. Rampuria  
Patent Examiner  
Art Unit 2124  
05/18/2005

  
**ANIL KHATRI**  
**PRIMARY EXAMINER**